

**Office of the Special Assistant
to the Deputy Secretary of Defense
for Gulf War Illnesses**



**SECOND ANNUAL REPORT
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Full Report

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INTRODUCTION

This report covers 1998, the second year of operation of the Office of the Special Assistant to the Deputy Secretary of Defense for Gulf War Illnesses (OSAGWI). As we noted last year:

[When we started] many at the Defense Department asked, 'How did we get into this mess?' The best answer that we can give is that the DoD finds it very hard to deal with battlefield casualties that don't manifest themselves in traditional ways. The loss of public credibility over Gulf War illnesses follows similar problems with Agent Orange and POW/MIAs after the Vietnam War. In this case, as the crisis over Gulf War illnesses grew, we did not listen to the veterans nor did we provide them with the information they needed to alleviate their fears and answer their questions. Today, much has changed in the way the Defense Department relates to those who served in the Gulf.

We are working very hard to answer the question most frequently asked— 'Why are so many veterans sick?' Despite a substantial increase in funds allocated to medical research, we still do not have answers to that basic question. While a careful review of past medical studies, now underway, may yet provide some new insights, recently funded research is not likely to provide answers either quickly or easily.

Even though the causes of unexplained Gulf War illnesses remain elusive, the men and women who served in the Gulf also want and deserve to know if they were exposed to anything that could threaten their health. This question is the unique responsibility of the Department of Defense. We owe it both to the veterans of the Gulf War and to those who serve today to ensure that we learn from the experiences of the war in order to better protect those who will serve in the future.

In August 1998, the Senate Veterans' Affairs Committee released the report of its Special Investigation Unit (SIU) on Gulf War Illness. While the report pointed out some areas of needed improvement for both the DoD and the VA, we were heartened by the SIU's confirmation that there was no government cover-up, "conspiracy of silence," or attempt to mislead the public. The SIU noted that our case narratives and information papers, "...represent the most thorough and comprehensive investigation by the DoD of possible chemical warfare agent exposure events since the Gulf War." In addition, the SIU acknowledged the value of our office in these words:

Establishment of the Office of the Special Assistant for Gulf War Illnesses in 1996 has increased the flow of information to veterans and the public about various events during the Gulf War that may have affected the health of veterans who served there. OSAGWI has also made efforts to solicit from Gulf War veterans their concerns about their health and possible exposures, and should continue these efforts.

The Senate Special Investigations Unit (SIU) also concluded that:

From analysis of information produced during UNSCOM inspections, the SIU finds, based on available data, that in addition to Khamisiyah, An Nasiriyah appears to be the only location in the Kuwaiti Theater of Operations where chemical weapons were fielded during the Gulf War.

To date, the results of our work are consistent with UNSCOM reports and the position of the Senate's SIU. Ten of our thirteen published chemical incident investigations concluded that either it was "unlikely" that chemical weapons were deployed or that chemical weapons were "definitely not" present. Another case involved a single soldier where we judged it "likely" that he had come into skin contact with mustard agent while exploring an ammunition bunker in southern Iraq. Another case involving Czech and French troops was assessed to be "indeterminate." The last case covers our investigations concerning Khamisiyah. We target notified over 99,000 Gulf War veterans that it is possible they may have been exposed to low levels of the chemical warfare agents sarin and cyclosarin as a result of demolitions that occurred at Khamisiyah on March 10, 1991.

The accomplishments of the year just past reflect our commitment to learn from, and provide information to, the veterans, and to continue our efforts to earn the public's confidence in our honesty and integrity

Since our last report, we have published four case narratives and two environmental exposure reports covering

topics ranging from depleted uranium and oil well fires to whether chemical warfare agents had been found in a storage tank at a Kuwaiti girls' school. We pressed forward with our program of reaching out to Gulf War veterans with visits to military bases and in town hall meetings throughout the country. We strengthened our ties with the Department of Veterans Affairs (VA) with a program to identify and monitor those who may have been exposed to depleted uranium, and we began a process to help veterans obtain inpatient hospital records.

We worked with other DoD organizations to incorporate the lessons from the Gulf War in new doctrine, policies, and procedures, and worked with the Office of the Joint Chiefs of Staff and Central Command on the redeployment of American forces to the Gulf to meet the continuing threat from Iraq. Most importantly, we continued to serve Gulf War veterans and their families by answering their questions concerning what may have happened during the Gulf War.

SETTING THE STAGE FOR OUR SECOND YEAR

Before we review in detail the second year of operations of the Office of the Special Assistant it is important that we place our operations in context. Accordingly, the following section, taken from the First Annual Report, explains why the Office of the Special Assistant was established in late 1996.

Events Leading Up To The Establishment Of The Office Of The Special Assistant

Soon after the Gulf War some American veterans, and later a handful from other nations, reported a variety of illnesses and disabilities. One issue raised early in the search for a cause was the possible exposure to chemical or biological agents. In testimony before the Congress, and in press interviews, senior Defense Department officials asserted that Iraq did not use offensive chemical weapons. To many observers, however, these statements were difficult to reconcile with a number of first-hand reports by chemical detection teams, both US and foreign, that indicated chemical agents were present on the battlefield. In the eyes of many in Congress, the media, and many Americans, DoD was not telling the truth.

In retrospect, the Department was given sage advice by a Marine Corps officer in a prophetic recommendation made in an official Marine Corps report on "Marine Corps NBC Defense in Southwest Asia." In the report, then-Captain David Manley noted that:

Survey data indicates that a significant number of Marines believe they encountered threat chemical munitions or agents.... There are no indications that the Iraqis tactically employed agents against Marines. However, there are too many stated encounters to categorically dismiss the presence of agents and chemical agent munitions in the Marine Corps sector.

In 1995, given the inability to come up with answers concerning the causes of the illnesses and the inconsistencies between the statements of senior Defense officials and those who served in the Gulf, President Clinton took decisive action. He established the Presidential Advisory Committee on Gulf War Veterans' Illnesses (PAC) and ordered the various departments of the Federal Government to reexamine the issues of possible exposure to chemical or biological agents during the Gulf War. The DoD and the CIA initiated new reviews of operational, intelligence and medical records. In March 1995, then-Deputy Secretary of Defense, Dr. John Deutch, established a Senior Oversight Panel and created the Persian Gulf Illnesses Investigation Team (PGIIT) within the Office of the Assistant Secretary of Defense for Health Affairs.

In September 1995, a reassessment of information by the CIA indicated Khamisiyah as a possible chemical agent release site. With this new information, the PGIIT was able to determine which troops had been at Khamisiyah. A May, 1996 UNSCOM inspection of Khamisiyah documented that 122 mm chemical rockets were in Bunker 73. In June 1996, the DoD announced that it was likely that American troops had unknowingly destroyed sarin-filled 122 mm rockets in March of 1991 at Khamisiyah.

In September 1996, the new Deputy Secretary of Defense, Dr. John White, referred to Khamisiyah as a "watershed event," and he called for the creation of a team to look at everything the Department was doing concerning Gulf War illnesses. The team examined all aspects of DoD's program and concluded that DoD's effort at the time was overwhelmed by Khamisiyah.

On November 12, 1996, Dr. White directed the establishment of the Office of the Special Assistant for Gulf War Illnesses with broad authority to coordinate all aspects of the Department's programs. Dr. White concluded that the Department had not placed sufficient emphasis on the operational aspects of the war and the implications of those operations. He asked that we put a special focus on the operational issues and issues of future force protection. He emphasized the need to ensure that we had a communication program to reach out to the veterans and to try to learn from them what went on during the war. Responsibility for health related programs, specifically the clinical program and the health and medical research program, remained with the Office of the Assistant Secretary for Health Affairs.

In building the Office of the Special Assistant for Gulf War Illnesses, we needed to make some major changes from earlier efforts. First, we had to do a better job of listening to our veterans' concerns and problems and incorporating what they were telling us into our investigations. Second, we needed to develop an outreach program in order to communicate effectively with our veterans. Third, we needed to significantly expand the formal investigation process for researching possible chemical and biological agent exposures. And fourth, we needed to expand our investigations beyond chemical and biological agents to include other potential causes of Gulf War illnesses.

Important First Year Investigations

Khamisiyah

First year activities were dominated by our analysis of the events surrounding Khamisiyah. Our inquiry focused on three questions: what happened at Khamisiyah, why did it take so long for the DoD and CIA to realize chemical munitions were destroyed there in early March 1991, and who was exposed to what possible low levels of nerve agent as a result of detonating stacks of chemical-filled 122 mm rockets in the open pit at Khamisiyah? In total, six reports were issued on Khamisiyah by the Office of the Special Assistant and the CIA. An additional independent report by the Army Inspector General, substantiates our findings concerning the events that took place at Khamisiyah. Our analysis shows that approximately one hundred thousand American troops and an unknown number of coalition and Iraqi troops may have been exposed to low levels of nerve agent as a result of detonating stacks of chemical-filled 122 mm rockets in the open pit at Khamisiyah on March 10, 1991.

In July, 1997 we notified those who were most likely exposed that

Current medical evidence indicates that long-term health problems are unlikely. The Department of Defense and the Department of Veterans Affairs are committed to gaining a better understanding of the potential health effects of brief, low level nerve agent exposures, and they have funded several projects to learn more about them.

DoD IG's Investigation of the Missing CENTCOM Chemical Logs On March 3, 1997 the Deputy Secretary of Defense directed the Inspector General, Department of Defense to investigate missing US Central Command (CENTCOM) Nuclear, Biological and Chemical (NBC) desk logs maintained in the Joint Operations Center (JOC), Riyadh, Saudi Arabia, during the Persian Gulf War. The DoD IG found that

Although directives, regulations and internal CENTCOM J1 (Administration) memoranda required that Gulf War records be retained, safeguarded, and archived as permanent records, the logs, in their entirety, were not safeguarded and archived by CENTCOM. Our investigation found no credible evidence to support a conspiracy to willfully and wrongfully destroy or dispose of the logs in violation either the Uniform Code of Military Justice or Title 18, United States Code.

Operations in Kuwait Several first-year case narratives deal with Marine Corps operations and other reported exposures in Kuwait, which were the subject of testimony before the PAC and Congress. In these Case Narratives we traced Marine operations through the minefield at the border of Kuwait and Saudi Arabia, to Al Jaber Air Base and on to an ammunition supply point in an orchard near Kuwait International Airport. Our assessment in each of these cases is that it is "unlikely" that chemical agents were present. We have not said "definitely not present" because some data or information is missing, like the Fox reconnaissance vehicle tapes.

OVERVIEW OF SECOND YEAR ACTIVITIES

The Office of the Special Assistant was designed around a three-part mission statement that emphasizes our

commitment to service personnel and veterans who served in the Gulf, and focuses on the operational impacts on health and future force protection. Over the past two years, our emphasis has shifted from an almost exclusive focus on chemical weapons to a more balanced inquiry that includes work on medical doctrine, pesticides, oil well fires, depleted uranium, and other possible environmental exposures. We have listened to our veterans and initiated a program to assist them in obtaining their inpatient medical records. We have recently reorganized to provide more emphasis on developing and implementing lessons learned from our investigations and on becoming a proponent for change within the DoD. All this occurs against the backdrop of an aggressive outreach program that centers around *GulfLINK/GulfNEWS*, our case narrative and environmental exposures report series, our HOT LINE and E-MAIL programs, and military base visits and town hall meetings. From the very beginning, we understood that public confidence in this office and the Department of Defense would have to be earned. Moreover, we started our efforts amidst calls for an investigation independent of the Department of Defense. Notwithstanding the work over the past two years, everything that we do, every report we write, and the testimony we present to Congress and the Presidential Special Oversight Board can be of value to the American people only if they have confidence in the objectivity and integrity of our office.

Investigations During 1998 we extended our inquiry concerning military actions in Kuwait by reporting on the operations of the 11th Marine regiment. We worked with our counterparts at the British Ministry of Defense to report on a suspected chemical agent detection at the Kuwaiti Girl' School. We also released a paper on the reported detection of chemical warfare agents by Czech and French forces. At the same time, we expanded our research efforts to better understand certain environmental threats, notably oil well fires and depleted uranium, that are suspects in the search for the causes of illnesses in Gulf War veterans. This research direction allowed us to probe deeply into the chemistry concerning hazards on the battlefield and explore the threats that could have presented themselves in guises of ordinary substances used in ways that had the potential to compromise our troops' health. By year's end, we were nearing publication of environmental exposure reports and information papers on pesticides and insecticides, the program for administering vaccines to troops, and inhibited red fuming nitric acid (IRFNA). The case investigations of the Tallil Air Base and the An Nasiriyah ammunition storage point (ASP) revealed new insights into locations that were known to have been used to store chemical warfare agents during the Iran-Iraq war. Based on eyewitness testimony, these investigations found that it was "unlikely" that there were any chemical warfare agents present at these sites during Operation Desert Storm, or at any time that the areas were occupied by US troops—a conclusion also reached by UNSCOM. In a related effort, we were well underway in 1998 on an information paper about the Gulf War's air campaign, with a specific focus on the plans, policies, and procedures employed to target suspected Iraqi biological and chemical weapons.

Reviews of Medical Literature In 1997, we commissioned the RAND Corporation (RAND), a federally funded research and development center, to prepare reviews of medical literature concerning chemical and biological warfare agents, immunizations, pesticides, pyridostigmine bromide, stress, infectious diseases, oil well fires, and depleted uranium. In 1998 RAND released its report on the Kuwait oil well fires, and we anticipate the release of RAND's review of depleted uranium in early 1999.

Medical Records

Many veterans, unable to locate their inpatient hospitalization medical records after the war, assumed that the records had been lost. In the course of our investigation into the handling of inpatient medical records during the Gulf War, we learned that most inpatient records had been sent to the National Personnel Records Center in St. Louis, Missouri after the war, and that the Army had developed an index of individuals by name, social security number, and hospital facility for 14,000 hospitalized in Army facilities. Members of our staff examined more than 2,000 boxes identified as Air Force and Navy hospital records from the Gulf War. This effort, augmented by Army reservists, resulted in the identification of an additional 7,000 Air Force and Navy inpatient hospital records and 3,500 Army records. Thus, by building on the Army's work, we were able to create a consolidated database to retrieve hospital records for many patients treated in Army, Navy, and Air Force Gulf War hospitals. Veterans who are interested in securing information from these records are encouraged to contact the Office of the Special Assistant at 1-800-497-6261 for help. The VFW and the American Legion, along with the other veteran service organizations, have highlighted this program in their member publications.

Review of Saudi Arabia's National Guard Medical Records

We have been working with the Kingdom of Saudi Arabia's National Guard to study the medical records of Saudi military personnel who served during the Gulf War. Meetings with Saudi Arabian military health care officials in late 1997 resulted in an invitation by the Saudi government to return in 1998. The protocol to conduct this study has been completed and approval by the Saudis is anticipated soon, with study completion expected in late 1999. Their cooperation is important to the broader investigation of Gulf War illnesses, and we are grateful to them for their support.

Outreach

Information we receive directly from Gulf War veterans is essential to our ability to produce the narratives and information papers we have published to date; the men and women who were there on the scene are the best sources of information for our investigations. During our first year, the Department of Defense Incident Reporting Line was an important information conduit for Gulf War veterans who wanted to get in touch with us. During 1998, the number of inquiries we received through the hotline declined, making initiated contacts the key to our continuing investigations. Our outreach efforts are based on maintaining an "open door" policy with the media, veterans groups, Congressional staff members, the newly established Presidential Special Oversight Board, and most importantly, our installation visits and Town Hall meetings. Our outreach efforts include the variety of notifications we send out, and the support we offer Gulf War veterans in obtaining their inpatient health records.

Veteran Service Organizations/Military Service Organizations

Regular meetings with the veterans' service organizations (VSOs) and military service organizations (MSOs) addressed issues of importance to the members. Topics included depleted uranium, oil well fires, anthrax immunization policy, and inpatient medical records. In September, members attended a morning-long on-site visit. The VSOs and MSOs met with staff members and observed the flow of information and the analytical process.

To ensure that the VSOs and MSOs received our reports in a timely manner, we provided special briefings prior to the public release of case narratives, environmental exposure reports and information papers. In addition, we developed an electronic mailing list and forwarded all *GulfLINK* news releases as they were made available.

Base Visits and Town Hall Meetings

We expanded our outreach efforts to include the Total Force—Gulf War veterans, those on active duty, those in the Reserves and National Guard, retired and separated personnel, DoD civilians, and family members—at military installations. Building on the efforts of the first year, during which we met with veterans and the public in 13 cities nationwide, we also expanded the agenda.

The revised itinerary included a two-day information exchange where subject-matter experts presented briefings to troops, leadership at all levels, medical staff, Gulf War veterans, family members, community groups, community service organizations, and installation staff. To reach those unable to attend the briefings, team members also operated a conference-style display placed at a high-traffic area, usually the installation exchange, commissary, or hospital. DoD's web site, *GulfLINK*, was demonstrated at the display. Special evening sessions for family members were added at the installations' requests.

Topics addressed at the town hall meetings spanned a broad range of interests, including the results of investigations into possible exposures from chemical or biological weapons, DoD force health-protection efforts, and information on resources available to Gulf War veterans and their families. Because many veterans' concerns fall under the purview of the Department of Veterans Affairs (VA), the VA participated at the town hall meetings as well.

Our purpose was to communicate—to listen and to provide information—to Gulf War veterans, their family members, and concerned citizens. The feedback from participants displayed varying levels of awareness of the available programs. However, in many cases, service members or spouses indicated a reluctance to participate in programs

due to career concerns—many are "toughing it out." This serious leadership problem was brought to the attention of the Joint Chiefs and the services have responded. In particular, the Army Chief of Staff directed his commanders to emphasize the availability of quality medical care and the Army Surgeon General directed medical commanders at all levels to support soldiers in need of medical care. Two news articles urging troops to seek the medical care they need were published—one by American Forces Information Service and the other for release on *GulfLINK*.

The outreach visits, conducted at three Army posts, three Marine Corps bases, and one Air Force base, provided the team with an opportunity to contact and talk with large numbers of Gulf War veterans. Through these opportunities, the team personally met with more than 6,000 members of the total force. We received more than 4,100 requests for copies of our investigative reports and 3,424 people asked to be added to the mailing list for *GulfNEWS*, bringing the distribution rate from its original 2,000 readers to nearly 20,000. Our plans for 1999 include one total force outreach visit each month.

In addition to the activities at military installations, team members participated in other outreach activities. We were invited to send representatives to two separate training courses for veterans' service officers; a number of presentations were made to members of the civilian medical community; and briefing teams participated in numerous VSO/MSO conferences, including the single-focus veterans groups. We also made presentations at professional meetings, including the World Wide Chemical Conference.

GulfLINK* and *GulfNEWS

GulfLINK, our web site (www.gulflink.osd.mil), continues to be a successful and useful tool for communicating with our veterans. Typically, *GulfLINK* receives more than 60,000 "hits" weekly. This number peaks when information releases of great interest are published. This year we added a mail-list service; subscribers are notified electronically when new information is posted to the site. The service was offered in September and now more than 1,500 people are using this service. In May, *GulfLINK* was selected as one of the "Best Feds on the Web" and was recognized by Vice President Gore for this achievement. We continue to look for innovative ways to improve the site.

GulfNEWS is our bi-monthly four-page newsletter in both print and electronic versions. In it, we highlight events of interest to Gulf War veterans, and present timely features based on our ongoing or released case narratives and information papers. In our January issue, for example, we talked about the \$12 million joint DoD and VA award for Gulf War health research studies, and we highlighted the Tallil Air Base case narrative and the MOPP (mission-oriented protective posture) and M8A1 information papers. In our regular column, Veteran Spotlight, we featured Gulf War veteran Kevin Moellenberndt, injured by a sniper's bullet during the Gulf War, but fighting back from his wounds and in pursuit of advanced degrees at the University of North Carolina. Other issues of *GulfNEWS* published in 1998 covered our environmental exposure reports on the Kuwait oil well fires and depleted uranium, the Defense Department's Gulf War documents-declassification efforts, and an article on DoD's mandatory anthrax vaccination program.

Notifications

Starting in April 1997, we began working closely with the Department of the Army's US Armed Services Center for Research of Unit Records (USASCRUR); and in 1998 our office continued bringing together former Army Gulf War operations officers (S3/G3s) from division and brigade size units to verify, validate, and, where feasible, add unit locations to the Persian Gulf Registry. As the DoD executive agent, the Army built (by reviewing approximately six million pages of Gulf War records) and maintains (as mandated by Public Laws 102-190 and 102-585) unit location and personnel information for all services in the Persian Gulf Registry. Ending in June, 1998, nineteen week-long conferences were held, with a total of 163 active, reserve, and retired operations officers returning to work on location data for their respective units. As a result of their work, the location database originally constructed by USASCRUR more than doubled the number of known unit locations to over 800,000 for all services. The Office of the Special Assistant for Gulf War Illnesses relies on these databases to identify veterans and units potentially involved in incidents we are investigating. Additionally, we are greatly appreciative of the opportunities to gather insights and information through direct contact with the operations officers and veterans of the Gulf War.

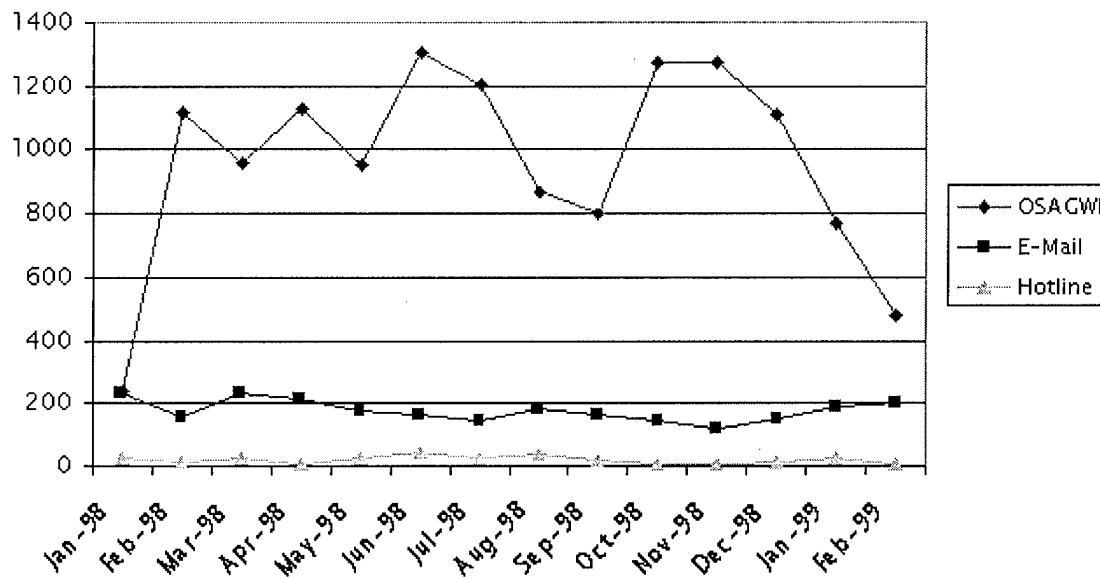
In the fall of 1997 we provided health notices to over 100,000 veterans of the Gulf War who may have been exposed to very low levels of nerve agent as a result of the demolitions at Khamisiyah. In 1998, that work continued—we refined unit location data and our scientific modeling analysis—and it will continue until we are satisfied we have

done all we can to answer veterans' questions about the health risks of that exposure. When our work is complete, we will continue appropriate notifications.

We continue to provide individual notification to veterans in conjunction with the release of case narratives and environmental exposure reports. This year we sent more than 4,000 letters to Gulf War veterans concerning the findings of our investigation. Since our office was formed two years ago, we have sent 156,000 such communiqués.

In the case of possible exposure to depleted uranium, we took this notification process one step further. Based on operational information, analysts identified those individuals who had the greatest exposure to the heavy metal. Analysts and veteran contact managers telephoned 192 of these veterans, provided them with the needed information, and answered questions. We also invited them to participate in a depleted uranium medical monitoring program. Those who could not be reached by phone were sent letters.

Veterans' Correspondence and Hotline We have opened lines of communication with Gulf War veterans through an outreach program which includes *GulfLINK* and *GulfNEWS*, regular meetings with veterans' service organizations, other veteran and active-duty organizations, and town hall meetings to update veterans on our progress and to hear, first hand, their concerns. During 1998, we logged in nearly 5,500 calls and letters to our office. Our Veteran Contact Managers continue to respond to inquiries individually.

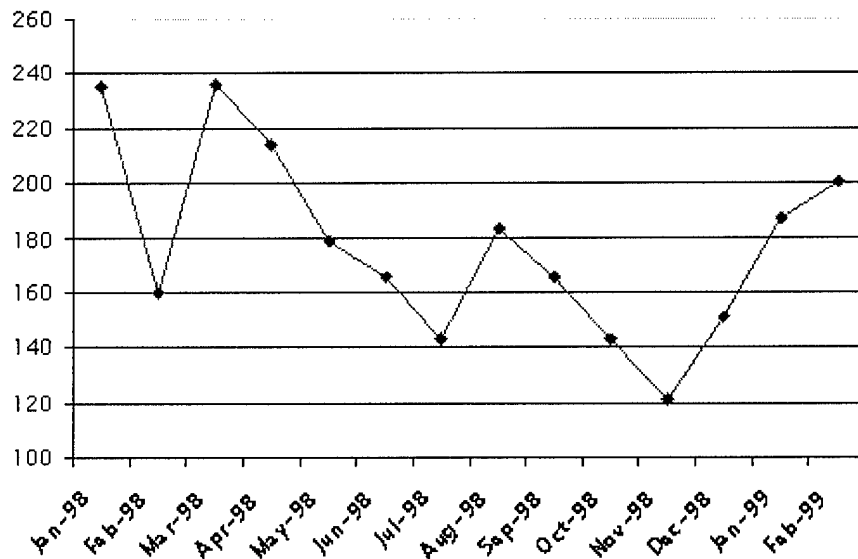


The top line of the chart above depicts the total number of attempts made by the OSAGWI outreach staff from January 1998 through February, 1999 to contact Gulf War veterans with information concerning their Gulf War experiences or in response to veterans' inquiries. The outreach efforts also respond to person-to-person contacts during town hall meetings, military base visits, and other public events. The two bottom lines represent the number of incoming correspondence via e-mail (squares) and calls to our 1-800 Hotline (triangles). Overall, OSAGWI's monthly outreach efforts significantly exceed the number of monthly incoming inquiries, typical of OSAGWI's commitment to reach Gulf War veterans with information about our ongoing investigations.

But it is not enough simply to receive and log all our correspondence with an eye to "getting back" to those who have taken the time to communicate their questions, advice, or even criticisms. I feel strongly that we have the responsibility to go the extra mile for every man and woman who gets in touch with us; we are obligated to review their correspondence, get to the heart of their interests, and report back to them with the best possible answers or information as quickly as possible. In 1998 we made every effort to be even more accessible and responsive to the many men and women who contacted us for information about the Gulf War, or who wanted to express their concerns about their own Gulf War experiences.

The results in some cases have been striking. In one instance, for example, a particularly caustic writer expressed

grave concern about the military's veracity and thought the heads of each department within the services and the Department of Veterans Affairs should be fired. In a subsequent letter, he asked what was "being done to treat people." Following our response to this second letter, he wrote, "thanks for your detailed letter ... I am sending a copy to [my Congressional representative]. We would suggest that you tell veterans in this country your story, in simple language. All citizens should know what is being done."



This chart depicts the slowly decreasing numbers of e-mails received by OSAGWI between January 1998, and February 1999 from Gulf War veterans and other individuals with Gulf War-related questions or comments. Although there was an increase in the trend from November, 1998, through February, 1999, the overall number of incoming correspondence is decreasing.

We intend to follow that advice in the next year. As we have since our office was formed two years ago, we will continue an active outreach effort that presents our findings quickly and thoroughly to veterans and the American public. We will speak to them and, more importantly, we will listen to them. It is important to note that the incoming calls on our Hotline have slowed dramatically over the past year, yet our outreach to veterans is going strong—in great part because we are not simply content to wait for veterans to contact us. We believe our mission must be proactive in reaching Gulf War veterans who may not otherwise know about the work we are doing and the results of our investigations.

Presidential Special Oversight Board The Presidential Special Oversight Board was created in July, 1998, and conducted its first hearing in November, 1998. Former Senator Warren Rudman, the Board's chairman, explained the operations of the Board this way:

Under general oversight, we are going to receive monthly updates from DoD about activities of OSAGWI's analysis groups and teams, case investigations, and information papers. We're going to receive bimonthly updates from the Persian Gulf Veterans Coordinating Board about ongoing research efforts. We'll receive bimonthly updates from the Joint Staff on related issues. On case narratives, we are going to and now we are already in the process of analyzing existing case narratives to determine if they reflect complete and accurate reporting of incident, meet with DoD representatives to discuss issues of concern, make recommendations to Board members about case narratives that need to be finalized, and ensure that issues requiring follow-up action are timely and properly implemented. Under current case investigations and information papers, we are going to continue to monitor efforts of the Office of the Special Assistant for Gulf War Illnesses in compiling information pertaining to current case investigations and information papers. We will analyze newly-reported case narratives and information papers as they are published.

SECOND YEAR INVESTIGATIONS

Case narratives, environmental exposure reports, and information papers are the way we report our findings to the American people. To date, we have published 13 case narratives, two environmental exposure reports, and four information papers, and there are more to come. The lessons learned from our investigations point us to the future. With every narrative and report, and through our interactions with veterans, we are able to make recommendations to the Secretary of Defense that will ultimately improve the way we manage battlefield health risks. Whether it's improving training and doctrine or providing better information about environmental health risks, the bottom line is that our work to date will ensure that DoD will be better prepared to meet the chemical, biological, and environmental challenges facing tomorrow's forces. To further bolster our commitment to achieve this goal, we have created a Lessons Learned Implementation Directorate. This directorate will play a major role to as we move into our third year of work.

Khamisiyah: Issues Raised by the Senate's Special Investigations Unit Khamisiyah remains the most important chemical incident of the Gulf War. The Senate Special Investigations Unit raised several issues concerning modeling of the chemical agent release as a result of the destruction of Khamisiyah ammunition depot. In order to address those criticisms, it is important to review the process by which we analyzed the Khamisiyah events. With the discovery that US troops inadvertently destroyed unmarked chemical weapons in an open pit at Khamisiyah, Iraq on March 10, 1991, it was imperative to determine if a significant chemical release hazard had been generated by that event. Since no instruments were present to measure atmospheric conditions or concentrations of agent released, the extent of this hazard had to be simulated through computer modeling and applicable field-testing. In November 1996, a panel from the Institute for Defense Analyses (IDA) was commissioned by the Deputy Secretary of Defense to review earlier Khamisiyah pit modeling and recommend measures to enhance the effort. They advised on model selection and methodology and recommended that weather modeling be coupled to the agent dispersion modeling. Additionally, to reduce model bias, they recommended the results of DoD and non-DoD models be integrated in the analysis. Lacking empirical data on the release caused by open-air destruction of 122 mm chemical rockets, the Department and CIA jointly conducted field tests at Dugway Proving Grounds in Utah to measure the release characteristics caused by the destruction of imported 122 mm rockets and warheads using a chemical agent simulant. These tests were carried out to determine how much agent was released instantaneously and how much over time due to evaporation. This data is often called "source terms" or "source characterization." Data from these field tests, combined with data from the intelligence community, led to the simulation-developed estimate that approximately 18% of the total calculated amount, or 342 gallons of nerve agent, was released from the destruction of the rockets in the Khamisiyah pit. With the source terms determined, the next step was the meteorological and dispersion modeling. The purpose of the meteorological modeling was to simulate the weather conditions in the vicinity of Khamisiyah on March 10, 1991 and succeeding days. Results from three global weather models, three high-resolution (or mesoscale) weather models, and three dispersion models—in five different combinations—were used. Coarse-scale (80-250 km horizontal resolution) weather fields produced by the three global models, combined with operational weather observations at a 300-400 km resolution (and further enhanced by declassified observations from the Saudis, the US Navy, and US Special Operations Forces) were used to initialize the high-resolution models. These models simulated the weather in the vicinity of Khamisiyah to a resolution of 1-5 km. This simulated weather and the source terms were input into the three dispersion models to replicate how the agent was dispersed and transported. Due to the uncertainty of the modeling and the consistency of the simulations, the results of each of the five combinations could be considered equally likely—a hypothesis endorsed by the IDA panel. Consequently, in order to err on the side of the veteran and identify areas of *potential* exposure, a union of the five simulation results was used to describe the potential hazard area. NOAA endorsed this methodology prior to publication. Upon publication, the Office of the Special Assistant commissioned a technical review of the effort. This review, undertaken by a panel of widely recognized experts in meteorology and atmospheric modeling from the National Oceanic and Atmospheric Administration (NOAA), academia, and the University Corporation for Atmospheric Research (UCAR), endorsed the methodology but recommended changes to the models and model applications. These changes have been incorporated and the simulation is being re-done. The SIU report states several criticisms and misconceptions regarding the modeling effort. These are:

- The Dugway experiments did not replicate Khamisiyah;
- DoD/CIA's effort was not peer reviewed;
- DoD/CIA modeling should have included environmental agent decay;
- DoD/CIA should have used an intersection (vs. union) of model results, thus identifying a smaller population of potential exposure.

Our response to each of these points was provided to both the SIU and the Presidential Oversight Board.

The Dugway experiments did not replicate Khamisiyah. The Dugway tests were never designed or intended to replicate the Khamisiyah event. The purpose of the Dugway experiments was to answer certain fundamental questions regarding the effect of placing charges directly on or adjacent to 122 mm chemical (simulant) filled rockets—specifically, which rockets in a demolished stack actually released agent and the mechanism of how that agent was released (whether as a vapor, or droplets, or a liquid spilled onto the soil and onto the wood packing material). During the testing, interviews and the participation of soldiers who conducted the Khamisiyah pit destruction were used to replicate demolition charge placement and rocket disposition and configuration. These experiments and subsequent simulations resulted in establishing how much of the agent was released and in what manner. Without the Dugway tests, that data would have never been discovered. DoD/CIA's effort was not peer reviewed. The DoD/CIA effort was reviewed by a panel of non-DoD experts from within and outside of government prior to and after publication. The reviewers from within the government were Dr. Bruce Hicks, and Mr. Will Pendergrass of the National Oceanic & Atmospheric Administration (NOAA). The reviewers outside the government were Dr. Steve Hanna, George Mason University, and Dr. Richard Anthes, National Center for Atmospheric Research (NCAR). DoD/CIA modeling should have included environmental agent decay. The DoD/CIA analysis did not model agent decay, which would reduce the size of the potential hazard, for several reasons. Very little is known on how the combination of environmental factors—such as hydrolysis, temperature, hydroxyl molecules, photochemistry and ultra violet light—degrade nerve agents. Simulating the precise effects of the combination of these and other factors without well-established, empirically-based data was deemed speculative. To diminish the potential hazard area in an unproven manner would be considered haphazard under scientific scrutiny and would violate our philosophy of erring in favor of the veteran. We agree that environmental effects would decrease the potential hazard area, but at this time, we are not in a position to state, in an accepted, scientifically credible fashion, what the results of those environmental effects are. To include such an immature process when trying to identify those individuals potentially exposed would have been a disservice to those veterans. DoD/CIA should have used an intersection (vs. union) of model results, thus identifying a smaller population of potential exposure. In the absence of any empirical data, we used a combination of atmospheric *and* contaminant dispersion models to simulate the potential hazard area resulting from the Khamisiyah pit destruction. Because of our philosophy of erring in favor of our veterans and the recommendations of expert reviewers, we used a "union" of the simulation results. These decisions are consistent with both expert opinion and a policy of making sure that every veteran who may have been exposed was given the benefit of the doubt.

Applying a less conservative philosophy—the intersection of model results and the inclusion of environmental decay—would have resulted in notifying fewer veterans but would have been inconsistent with our philosophy. We could not say with certainty that any one of these five consistent simulation results was more realistic than the others were. In such a case, using the intersection of the hazard areas as the basis for notification of potential exposure would be inappropriate. However, potential exposure does not necessarily imply illness. The standard used in our simulations is the General Population Level (GPL) established by the Centers for Disease Control. This level is over 300,000 times lower than the level that causes the first noticeable symptoms of G-series nerve agent exposure. Low-level exposures describe a level that falls between the GPL and first noticeable effects. There is very limited epidemiological research on the effects of exposure to such low levels of G-series agent. Our simulations identified a population potentially exposed to low-level nerve agents that can facilitate such research. That research continues. However, to date, emerging results have been unable to link potential exposure to low-levels of nerve agent to Gulf War illnesses. As such, our work to date is consistent with the Senate SIU report. We have responded to the Senate Veterans Affairs Committee claims directly, and again during our testimony before the Presidential Special Oversight Board. Specifically, we noted that:

We must first realize that modeling isn't reality. Model differences are expected and no model can assure absolute certainty. The question to ask is: 'Are the results of the simulations scientifically credible based on the data available?' The technical review panel that took a hard look at our modeling efforts stated that the ensemble created by the union of DoD/CIA simulations produced 'credible predicted concentrations for use in determining the area where service personnel might have been exposed'. Second, we had to make policy choices and those can always be 'second guessed.' Differing philosophies—union vs. intersection, decay vs. no decay—all impact the potential exposure hazard. Given the uncertainty of simulating the events of Khamisiyah seven years after the fact, we selected a policy with the best welfare of the veteran in mind. If there was a chance of potential exposure, the veteran was included. Third, the models used, whether the DoD/CIA suite, AFTAC's [the Air Force Technical Assistance Center], or others, are subject to challenge. Indeed, any institution with the ability to conduct atmospheric modeling can claim their model is 'better.' Going back to our first thought—are the models and their results scientifically credible? We used a process recommended by the Institute

for Defense Analysis (IDA) and endorsed by a review of experts. Their assessment is that our work is credible. That being the case, we should focus on the underpinning assumptions of the work done—not the sequential inclusion of new or different models and their results. Consequently, we continue to hone our assumptions and refine our modeling procedures to better serve our Gulf War veterans.

Kuwaiti Girls' School

The joint US and United Kingdom case narrative on the Kuwaiti Girls' School was released in March of 1998. The Senate Special Investigations Unit (SIU) cited this narrative as:

OSAGWI's best effort reviewed by the SIU staff as of May, 1998. While this incident is ultimately labeled 'Definitely Not' a case of chemical agent presence, it goes to great lengths to explain the initial confusion surrounding the preliminary identification of a noxious liquid found at that location as mustard agent. The case narrative presents a credible explanation of the way this occurred.

This case narrative provided information about the discovery and testing of a storage tank suspected of containing chemical warfare agent. The reported discovery and testing of the storage tank took place in early August 1991. Both UK and US military elements tested the contents of the tank. Concern over the contents of the tank, coupled with the overlap in jurisdiction at the national and organizational level, resulted in four separate operations being conducted at the tank. These operations were not necessarily conducted by the same individuals and these individuals were not always aware of the other operations. This meant that some individuals ended their involvement with limited information and unanswered questions about the nature of the tank's contents.

During these four operations, multiple tests were conducted using several chemical detectors, including two Fox nuclear, chemical and biological (NBC) reconnaissance vehicles. Many of these tests gave positive indications for mustard agent, with the two Fox vehicles alarming for phosgene as well.

In 1994, when Iraqi chemical weapons were suggested as a possible cause of Gulf War illnesses, events at the Kuwaiti Girls' School became a focus of government and media scrutiny. After reviewing materials provided by the Department of Defense, including the data from multiple positive tests and hearing the testimony of those involved in testing the tank, the Senate Committee reviewing the incident concluded that chemical warfare agent was present in the storage tank.

A joint US-UK investigation uncovered evidence indicating the events at the Kuwaiti Girls' School in 1991 were not as simple as they seemed, nor were the results of the on-site 1991 testing definitive. Analysis of the Fox mass spectrometer tapes definitively and consistently showed that no known chemical warfare agent was present in the tank. Analysis of the Fox tapes did, however, indicate the presence of inhibited red fuming nitric acid (IRFNA). In addition, 1991 British analysis of samples taken from the tank stated that "the samples were entirely consistent with the contents of the tank being nitric acid."

Our investigation unearthed further evidence that significantly bolstered the assessment that it was nitric acid—not chemical warfare agent—in the tank. Research revealed that Iraqi forces used the school as a test and maintenance facility for Silkworm anti-ship missiles, which use IRFNA as their fuel oxidizer. This provided a plausible reason for positioning the tank at the school. In addition, the physical descriptions of the substance provided by those directly involved were not indicative of any known chemical warfare agent, but are consistent with the presence of IRFNA.

There were several key lessons learned from this investigation, not the least of which could be stated simply, *"Wait until all the evidence is in."* Prior to the conclusion of our investigation, broadly-worded pronouncements from the Presidential Advisory Committee prematurely supported the accounts that chemical warfare agents were present at the Kuwaiti Girls' School, despite not having looked into what the British might have on this subject. Our work with the UK resulted in a finding that the storage tank contained IRFNA rather than a chemical or biological warfare agent. That posed a considerably less troublesome health threat to veterans who helped retake Kuwait and who may have come near the Girls' School.

Once the facts had been brought to light, the lessons to be learned from the investigation could be properly developed. Many individuals and organizations had contact with the missile fuel storage tank at the Girls' School; however, they did not always communicate with one another, nor did they always know of the others' contact. This was primarily attributable to the various jurisdictions of each organization and the principle that only those who need to know should be told. A prime example is the US Army Corps of Engineers, whose personnel initially investigated the tank but who were left out of subsequent discussions. Although the Corps had pertinent information that may have brought this issue to closure early on, they were not provided with additional information due to jurisdiction and the corresponding need-to-know.

Another lesson learned in the area of communication is that reporting solely to command elements—rather than specific individuals involved—does not always provide the closure desired. Institutional memory is held by individuals, not organizations; organizations lose their institutional memory to staff turnover. This was the case when the results of the British analysis of the samples of resin from the tank were relayed to Task Force Victory. The principals involved from Task Force Victory had already left the theater of operations and were never notified of the results. Interviews with these individuals continually yielded the same outcome: that, to their knowledge, the tank contained chemical warfare agent. Conflicting reporting between those involved and the U.S. DoD and the British Ministry of Defence (MOD), coupled with the fact that a final report was never generated, warranted a joint investigation into the matter. Notifying the individuals involved of preliminary results could have brought the matter to conclusion rapidly, while providing immediate closure to many of the questions and concerns churned up by this incident.

Another valuable lesson learned from this investigation is that all reporting related to a potential CW/BW incident should be documented. Regardless of whether or not it substantiates the allegation, all evidence should be recorded in written form, with the ultimate goal being a formal report on the incident to be disseminated to those involved and other appropriate parties. This is particularly essential when there are many jurisdictions involved. Furthermore, this documentation needs to be recorded at the time of the incident, with all initial and subsequent documentation passed up through the chain-of-command.

11th Marines

As we noted, during the first year we traced Marine operations through the minefield at the border of Kuwait and Saudi Arabia, to Al Jaber Air Base and on to an ammunition supply point in an orchard near Kuwait International Airport. We then filled in Marine operations with the 11th Marines case narrative which was released in November 1998. This case narrative focuses on NBC alerts experienced by the 11th Marines, an artillery regiment supporting the entire 1st Marine Division. Many of these events had previously been reported to both the US Congress and to the PAC. The 11th Marines entered Kuwait from the south and moved to the vicinity of Kuwait City during the 100-hour ground campaign. Due to the size of the 11th Marines and its unit's various locations across the battlefield, many of the events and lessons learned described in this investigation overlap with or are complementary to other Marine related investigations, such as the Marine Minefield Breaching narrative published in July 1997, the Fox Detections in an ASP/Orchard published in September 1997, and the ongoing investigation into events at a Cement Factory in Kuwait, planned for publication in 1999.

In the unit chronologies and operational logs for the Gulf War, the 11th Marines reported many alerts for chemical warfare agent. Elements of the 11th Marines initiated some of these alerts. Other alerts began elsewhere and were passed by radio to 11th Marines units. Positive chemical agent tests, using various detection devices, triggered some of the alerts. Unknown to most Marines or to US forces in general, all of the devices available to Marine units could produce false positive readings in the presence of substances other than CWA. The M8A1 chemical agent alarm and Fox vehicle information papers, also published in 1997, help to explain the equipment's limitations, but not the operator's lack of awareness of these limitations. For much of the ground campaign in Kuwait, sabotaged oil wells exposed Marines of the 1st Division to high concentrations of smoke and raw petroleum. In retrospect, it is clear that such pollution could affect detection equipment and could have caused many of the chemical alerts recorded by the 11th Marines.

After studying the written documentation (to include PAC and Congressional testimony) and interviewing witnesses, this investigation cataloged 18 potential NBC incidents associated with the 11th Marines. No chemical casualties were reported in any of the incidents. Of the 81 individuals/positions selected as primary witnesses, 69 were contacted in person or by telephone. For various reasons, the remainder could not be identified, located, or contacted.

The results of the investigation were that seven of the reported incidents were assessed as "Unlikely" because witnesses could recall little about the alerts and no evidence could be found of casualties or delivery means. For eleven of the incidents, substantial information was collected; however, in each case, investigators judged the chance of chemical warfare agent presence as "Unlikely," by applying a rationale similar to the previous reports.

The investigation produced many observations on how to possibly reduce the "fog of war" surrounding possible chemical warfare related events. Many witnesses interviewed noted that some units sometimes failed to apply proper

procedures and discipline in handling chemical alerts. In particular they broadcast "gas, gas, gas" and similar alerts over tactical radio networks without clear evidence of a chemical attack (for example, when observing incoming fire at a distance), or failed to note "who, what, where, and when" in initiating or passing NBC alerts. Consequently, some units had no choice but to increase their protective postures to MOPP Level 4 as a precaution. They often did not know if the triggering "threat" was upwind, nearby, or actually chemical.

Personnel sometimes used NBC detection equipment in ways for which it was not designed. In particular, both the CAM and the Fox reconnaissance vehicle were mainly used to "sniff" ambient air some distance from the ground. Both pieces of equipment were optimized to detect CWA at close range (and consequently higher concentrations). The CAM was designed to identify and sort contaminated personnel and vehicles from uncontaminated personnel and vehicles. The Fox was developed to map out and mark terrain contaminated with persistent agent. Neither piece of equipment was optimized to provide initial chemical attack warning. Because of trust in "new" technology equipment, Marines sometimes relied on devices considerably less sensitive than chemical agent detectors built specifically to sample ambient air. In the case of the Fox vehicle, the threshold for detection in the "air-hi" mode was higher than the agent concentration that would cause casualties. In the face of an actual chemical attack, relying on the Fox as a substitute for other devices could result in missed early warnings and increased chemical casualties.

Marines had inadequate understanding of the capabilities and limitations of the various chemical warfare agent detectors, partly because the Marine Corps fielded some of these devices shortly before the ground campaign, partly because of operations in levels of pollution unanticipated by equipment designers, and partly because this information may not have been included in their training. Personnel with NBC expertise should have a high degree of proficiency with all aspects of their equipment, but rank-and-file Marines also must have a better working knowledge of the NBC detection equipment they might use.

This and other investigations have brought into sharp focus the strengths and weaknesses of NBC documentation practices during the Gulf War. Investigators often faced inadequate or conflicting information on NBC incidents and other issues of significance for veterans' health. The Marine Corps' practice of requiring regular unit chronologies—with detailed documentation as attachments—helped greatly and served as a solid foundation for recreating a sequence of chemical incidents for the 11th Marines. Often, however, detail was scant and witnesses had difficulty recalling additional information.

Perhaps only with hindsight can we now understand the importance of contemporary documentation of NBC (and other operational) activity. Current and future combat deployments may raise similar questions about long-term health impacts. Implementation of the suggestions above would require changes or improvements to NBC-related training throughout the US military services.

Tallil Air Base

Given the importance of demolition operations at Khamisiyah it was natural for investigators from our office, the PAC, and UNSCOM to focus on activities at the neighboring bases and depots at Tallil and An Nasiriyah.

The Tallil Air Base investigation concerns multiple US Army units and USAF explosive ordnance disposal (EOD) units, and the possible presence of chemical warfare agents (CWAs) at the Iraqi air base. Tallil was a major tactical air base in southeastern Iraq during the 1980-88 Iran-Iraq War, and fighter-attack aircraft from this base used CW against Iranian targets. The Iraqis were thought to have stored some of the CW used during this conflict in an S-shaped bunker at Tallil. Consequently, these bunkers, and other facilities assessed to support Iraq's national CW programs, were given a very high priority during the Coalition's air campaign. A 2,000-pound bomb struck Tallil's S-shaped bunker in early February 1991—seriously damaging the bunker and partially collapsing the ceiling.

During the cease-fire at the conclusion of Desert Storm, units of the 82nd Airborne Division occupied Tallil. Before their withdrawal from Iraq, US forces destroyed the facilities, equipment, and munitions at Tallil (and in the surrounding area) that were not damaged during air and ground phases of Desert Storm.

During the US occupation, chemical warfare personnel searched Tallil for CW using specialized chemical detection equipment (including Fox vehicles). EOD personnel also joined in the search. Interviews with these individuals and the Combat Engineers who did much of the hands-on demolition work, in addition to a comprehensive review of available information (including national-level intelligence sources), did not turn up evidence that chemical weapons or agents were present at Tallil during the US occupation.

The UNSCOM team that inspected Tallil and its S-shaped bunker in December 1992 also did not find evidence of chemical weapons or bulk agents. However, neither the US occupation forces nor the UNSCOM team was able to inspect the portion of the S-shaped bunker where the ceiling had collapsed or examine any materials buried under the remaining debris. After the war, the Iraqis cleared the intact area of the bunker of rubble and used it for storage of conventional munitions. If the Iraqis were storing chemical weapons or agents in this facility at the time it was struck during the war, the resulting contamination almost certainly would have required the Iraqis to completely remove all bunker debris, extensively decontaminate the area, and then rebuild before using the bunker for conventional storage. This was not done. Given the preceding facts, combined with the lack of any US reports of chemical warfare agent detections or chemical warfare agent injuries, we found it "Unlikely" that chemical warfare agents were present at Tallil Air Base during the period of US occupation in 1991.

A lesson learned during this investigation concerns the distribution of current intelligence information. Due to pre-war briefings that suggested Iraqi chemical warfare (CW) weapons were painted certain colors or marked with color bands, some individuals at Tallil believed that they had discovered, reported, or destroyed Iraqi CW munitions. During post-war assessments of Iraq's CW program, we have confirmed that this identification method was totally unreliable for Iraqi munitions. However, EOD personnel who were interviewed indicated that they relied on specific munitions design characteristics to identify CW-agent-bearing weapons, but that no system by itself was considered 100 percent accurate.

An Nasiriyah

The An Nasiriyah case narrative is an investigation into the possible presence of chemical warfare agents, chemical weapons, and biological weapons at Iraq's An Nasiriyah Southwest Ammunition Storage Point (ASP), during, and immediately after, the Gulf War. The proximity of this ammunition storage point to Tallil Air Base, and the fact that many of the same units conducted similar operations at both installations, makes this investigation a continuation of the Tallil inquiry.

During the 1980-88 Iran-Iraq War, the An Nasiriyah ammunition storage point (ASP) was a major Iraqi munitions depot. During the 1990-1991 time frame, the US intelligence community suspected that this ASP contained chemical weapon or biological weapon munitions because of the presence of S-shaped and 12-frame bunkers. An Nasiriyah had five of these uniquely shaped bunkers, and all five were struck by air-delivered ordnance.

In 1996, in accordance with United Nations Resolution 687, Iraq declared that more than 6,000 155mm mustard-filled artillery rounds had been stored in a bunker at the An Nasiriyah Southwest ASP from approximately January 15, 1991, to February 15, 1991. Iraq claims to have moved these munitions to the Khamisiyah ASP to prevent them from being destroyed by coalition air strikes. To date, United Nations Special Commission inspections, interviews, and other investigation research supports the Iraqi's declaration, and these 155mm mustard rounds are the only chemical weapons likely to have been stored at the An Nasiriyah ASP during the air campaign.

Bunker 8, which according to Iraq's declaration held the munitions until February 15, 1991, was not one of five uniquely shaped bunkers suspected of chemical weapon or biological weapon storage, and was not struck during the air campaign bombing. Bunker number 8 was searched by US ground forces during the cease-fire and destroyed by demolition charges prior to the withdrawal of US troops in March 1991.

During the post-war US occupation and demolition, no chemical weapons or biological weapons were found at this facility, nor was any chemical agent contamination detected in the storage area. Analysis of post-war information, including information from United Nations Special Commission inspections of various Iraqi chemical weapon and biological weapon storage sites, indicates that, during Desert Storm, the Iraqis had stored chemical weapons and biological weapons in a variety of bunkers, and often in open storage. Today, the intelligence community believes that their pre-war assessments of suspect chemical weapon and biological weapon bunkers was inaccurate, and that, during Desert Storm, the five bunkers at An Nasiriyah Southwest probably did not store chemical weapons or biological weapons.

The results of our investigation into the US forces combat operations, inspections, and demolition operations at An Nasiriyah, like that of Tallil and Khamisiyah, was consistent with UNSCOM reports and testimony made by UNSCOM to the PAC in Buffalo, NY in July 1997.

Depleted Uranium

In August, we published our first environmental exposure report. This report, on the use of depleted uranium in the Gulf War, was the culmination of nearly two years' investigation and analysis involving hundreds of interviews with veterans, reviews of scientific literature, discussions with scientists in the fields of health physics, nuclear medicine, and occupational health, and reviews with government and non-government agencies. This report also outlines ongoing medical follow-up and preliminary results of the follow-up being conducted by the Department of Veterans' Affairs on veterans known to have been exposed to depleted uranium during the Gulf War.

To many veterans and members of the public, the term "exposure"—especially when associated with the word "radiation"—signifies that adverse health effects will follow. In fact, exposure in this case is used to describe events and situations where soldiers came into contact with depleted uranium fragments and particles which form when DU strikes armor targets.

The report acknowledges that many American soldiers were exposed to DU through wounds, inhalation, or ingestion. It also identifies and addresses significant shortcomings in the way US troops were trained to operate in environments where DU contamination was present, and identifies lessons learned that can be applied to future operational deployments. Further, it outlines steps the Office of the Special Assistant has taken to ensure that DU training and awareness receives proper emphasis from all service components.

Each of the DU-exposure incidents reported to date was investigated and analyzed in detail. Investigative efforts were aimed at establishing the facts and circumstances surrounding each incident and determining who might have been exposed. This effort is still ongoing, but the investigation has determined the essential facts of the most serious (Level I and II) exposure incidents and scenarios, as well as identifying many of the participants. The report outlines the new, expanded, medical evaluation program aimed at identifying, evaluating, and providing medical follow-up—if needed—to personnel likely to have incurred the highest DU exposures. Although the focus of the notification effort is on these participants, soldiers who had lesser exposures can also request an evaluation for DU exposure.

Based on the data developed to date, the Office of the Special Assistant believes that while DU can pose a chemical toxicity and radiological hazard under specific conditions, the available evidence does not support claims that DU caused or is causing the undiagnosed illnesses some Gulf War veterans are experiencing.

This office will continue to apply lessons learned from the investigation and research efforts to safeguard the health of our troops. In tandem with efforts to identify exposed personnel, efforts were undertaken to assess the possible health risks and medical significance of various exposure groups. Experts in relevant fields were consulted and expert literature was reviewed. The US Army Center for Health Promotion and Preventive Medicine (CHPPM), is currently performing DU dose assessments in an effort to apply refined data (derived from computer modeling and live-fire test results) to the study of DU's health effects. The RAND Corporation is undertaking an independent review of medical and scientific literature on known medical and health effects. Although the CHPPM effort is ongoing, preliminary estimates of worst-case exposures do not indicate a significant radiological hazard.

Our DU report also notes past inconsistencies between peacetime guidance and wartime practices. It explains why much of the guidance in place at the time of the Gulf War was excessive or disproportionate to the actual exposure hazard. It makes the case that future guidance must be practical and applicable to battlefield operations where contact with DU, under uncontrolled conditions, can occur over a broad range of environments. The report presented some lessons learned since the Gulf War, addressed pre-Gulf War training shortfalls, and recommended steps DoD can take to better prepare troops to operate in environments where they might encounter DU contamination.

Several organizations have reviewed the limited existing medical literature on DU and the much more voluminous literature on natural uranium. In addition, the VA has been monitoring the health of soldiers who were exposed to DU during the Gulf War. Here is a sample of these reviews:

From the National Institutes of Health, published in 1994 in the *Journal of the American Medical Association*, "Uranium, a heavy metal, causes kidney damage and when inhaled can accumulate in the lungs, but no pulmonary toxicity has been reported. The symptoms reported among the Persian Gulf veterans do not appear to be related to the heavy metal uranium."

From the Presidential Advisory Committee's 1996 report, "It is unlikely that health effects reported by Gulf War veterans today are the result of exposure to DU during the Gulf War."

The "Independent Consultant Report" prepared by the VA's Dr. Melissa McDiarmid for the Senate's

Veteran Affairs Committee, released in September 1998, concluded, "Because the radioactivity of DU is very low, the chemical toxicity of DU may be the more significant contributor of human health risk. ... Other heavy metals - such as lead, chromium, tungsten, and uranium--are (also) chemically toxic. The toxic properties of DU and uranium have been broadly studied. ... In summary, while DU is a radiological hazard, its relatively low radiological activity, the low likelihood of prolonged duration of exposure (except for the group with retained metal fragments), ... suggests that a significant cancer risk from DU exposure is small."

To assess the health of Gulf War veterans exposed to DU, information has been analyzed from medical evaluations of those veterans most heavily exposed to DU. Since 1993, the Department of Veterans Affairs has been monitoring 33 Gulf War veterans who were seriously injured in friendly fire incidents involving depleted uranium. These veterans are being monitored at the Baltimore VA Medical Center. Many of these veterans continue to have medical problems relating to the physical injuries they received during friendly fire incidents. About half of this group retain depleted uranium metal fragments in their bodies. Those with higher than normal levels of uranium in their urine since monitoring began in 1993 have embedded DU fragments. These veterans are being followed very carefully, and a variety of medical tests are being carried out to determine whether any health effects are attributable to the depleted uranium fragments.

The veterans being followed who were in friendly fire incidents but who have not retained depleted uranium fragments, do not, generally speaking, show higher-than-normal levels of uranium in their urine. For the 33 veterans in the program, tests for kidney function have all been normal. In addition, the reproductive health of this group appears to be normal; there were no observable birth defects among babies fathered by these veterans between 1991 and 1997.

The Department of Defense and the VA are committed to continuing to study the health implications of exposure to depleted uranium and will continue to assess the possibility of a cause-and-effect relationship as the on-going studies at the Armed Forces Radiobiology Research Institute are completed and further information is obtained from the VA on the DU Medical Follow-up Program.

Depleted uranium training remains a high interest item. On January 7, 1998, Deputy Secretary of Defense John J. Hamre issued a directive to the services to review their depleted uranium training programs, including identification of personnel categories to receive the training, a schedule for full implementation, and plans for periodic retraining. Development and implementation is under way and further progress in development, review and implementation of this training is being closely followed by this office with specific reports from the services required on a regular basis.

Kuwait Oil Well Fires

Our second major environmental exposure publication in 1998 dealt with the subject of the Kuwait oil well fires, set by the Iraqis before the beginning of the ground war. Many Gulf War veterans have voiced concerns about the health effects of their exposures to the smoke clouds that billowed over a large portion of the theater of operations. Our Oil Well Fires Environmental Exposure Report, released in November 1998, presents an analysis of the impact of the fires on the health of troops working in and near the smoke plumes. In so doing, our report incorporates the independent results of a medical literature review undertaken by RAND, and risk-assessment studies conducted by the US Army Center for Health Promotion and Preventive Medicine (CHPPM).

Beginning in January and continuing into late February 1991, Iraqi forces deliberately set fire to over 600 Kuwaiti oil wells, creating huge columns of smoke. The destruction of Kuwait's oil fields did not come as a complete surprise to Coalition forces. By late 1990, intelligence and other sources indicated that Iraq would implement a "scorched earth" policy toward Kuwait's oil infrastructure, should Iraqi forces face the threat of forced ejection from Kuwait. As the air war and the simultaneous onset of the systematic destruction of the oil fields began, various Coalition commands began to disseminate information regarding hazards associated with massive oil well destruction. Command level guidance was issued warning commanders and troops of the likelihood of oil fires, as well as outlining precautions to limit exposure to contaminants found in the oil fire smoke.

This environmental exposure report acknowledged that some veterans were, on occasion, subjected to short-term exposures where they were literally covered with residue from the oil well fires. These exposure incidents, while intense, were generally short (weeks or months vs. years) in duration and involved exposure to smoke, oil, soot (carbon particles), and other by-products of the oil fires. Medical studies indicate that no significant acute medical

problems have been identified with skin contact to crude oil. However, crude oil may be mildly irritating to some sensitive individuals—particularly in cases where there is contact with the eyes. Furthermore, the volatile organic compound fraction of crude oil is an inhalation hazard. In very high concentrations these compounds may cause depression of the central nervous system and lead to other symptoms. Available environmental monitoring data from EPA teams, however, indicate that levels of volatile organic compounds were too low to result in adverse short-term or long-term health effects.

The long-term health effects associated with short-term particulate exposures are less clear. There is a lack of information in the literature that evaluates this somewhat unique type of short-term intense exposure. Clinical and anecdotal information available on a cadre of firefighters whose exposures were more severe in terms of frequency and duration indicates that the firefighters who went to Kuwait and had, on average, 10 years experience in fighting similar fires, did not use respiratory protection equipment, did not exhibit the symptoms commonly reported by Gulf War veterans, and have not experienced any long-term health effects.

The results of two troop health risk assessments of carcinogenic and toxic exposures were incorporated into this investigation while a third report on particulate exposure is planned. The intent of including these results is to provide information helpful in determining the extent to which the findings of the health effects literature review may apply to veterans.

The risk assessment studies conducted by the US Army Center for Health Promotion and Preventive Medicine and its predecessor, the US Army Environmental Hygiene Agency, support the general findings of the RAND report. Risk levels, based on calculated and measured contaminant concentrations, were estimated for each troop unit deployed to the Persian Gulf and compared to US EPA exposure criteria to protect the general public.

The risk—that is, the potential for an adverse health effect to occur in exposed populations—was calculated for cancer and non-cancer (i.e., damage to the cardiopulmonary, renal, neurological, and reproductive systems) causing agents. The results indicate that, for all troop units deployed to the Persian Gulf, the potential for excess cancers and non-cancers (respiratory, neurological, kidney, and reproductive diseases) to occur from oil well fires and all contaminants in areas surveyed was below the range in which the US EPA would expect the onset of disease to typically occur in a normal population.

The RAND report found that, with the exception of particulate matter, the maximum concentrations measured for the pollutants of concern in the Persian Gulf region were virtually the same as levels found in suburban locations in the United States. Furthermore, these levels were lower than those found in large urban centers in the United States and much lower than the exposure limits for hazardous substances in the workplace recommended by the National Institute of Occupational Safety and Health.

With the exception of particulate matter, the levels of pollutants measured in the Gulf were lower than those that are known to cause short- and long-term adverse health effects. Particulate matter levels were found to be extremely high when compared to levels observed in the U.S. However, while the burning oil wells made a significant contribution, these levels were largely the result of the natural background conditions of the region (e.g., very fine wind blown sand). The RAND report notes an absence in the peer-reviewed literature of epidemiological studies on health effects due to particulate matter exposure in the indigenous population and U.S. troops during the Operation DS/S timeframe.

To offset this limitation additional investigations into the health effects associated with particulate matter exposures under conditions experienced in the Persian Gulf are underway. These investigations will shed light on what, if any, short- and long-term adverse health effects could be expected from exposure to silica (principal component of sand and particulate matter in the region). These investigations will also address the connection between particulate matter exposure levels and the onset of allergic responses such as asthma and bronchitis.

LOOKING TOWARD THE FUTURE

Lessons Learned Implementation Directorate

As we enter our third year, we have increased our focus to ensure that the Department of Defense is a learning organization. We have established a Lessons Learned Implementation Directorate with the mission of:

Identifying those lessons which can be learned from the 1991 Gulf War and our handling of the reports of its veterans' illnesses;

Determining methods to best learn those lessons;
Identifying those organizations within DoD which are responsible for affecting necessary change and ensuring they do so.

Immediately following the war, DoD developed many "lessons learned." Because the Gulf War almost coincided with the end of the Cold War, many of those lessons are no longer relevant, or they have had to be unlearned as the nature of our armed conflicts has evolved. Technology advancements have also changed the way we fight and increased the expectations of our troops and the American public.

As we identify the lessons to be learned, our focus will not be on how we fight in the near term, but on the consequences of today's actions on the health of our service members in the long term. However, we do not intend to limit ourselves to purely medical or battlefield hazard protection. These must be addressed within the overall operational and intelligence-gathering contexts. It will require a revolutionary change in how commanders view risk to accomplish their assigned missions, but will not change the basic reality that armed conflict is inherently dangerous.

Where Do We Go From Here

The majority of the papers remaining to be completed are in the area of chemical incidents. Of the 19 papers completed, 13 were chemical case narratives and four were information papers concerning issues relating to the possible use of chemical weapons during the Gulf War. And though we continue to examine the issue of chemical warfare agent exposures in the Gulf, we have also begun to extend our scope of work by publishing two reports on environmental issues. These environmental papers, and those to be completed, require more work than our chemical incident narratives. Preparation of scenarios, use of questionnaires, estimates of dosages, and health risk assessments all take time and demand careful evaluation.

As we move into our third year of work on behalf of Gulf War veterans, we look for guidance from the Presidential Special Oversight Board to help us bring credible closure to at least some of our investigations, particularly those dealing with chemical and biological exposures. At their public hearing on November 19, 1998, we asked the Board for help:

... at this time none of the case narratives that we have under investigation appear to have uncovered any information that would contradict UNSCOM's findings. Frankly, having gotten this wrong before when the Department was incorrect in its conclusion that no American troops were exposed to chemical agents, the Department cannot make the final determination of when the stones are too small to bother to turn over.

... this is a determination that this Board, in concert with the leadership of the Congress and the veteran service organizations, must help us make. ... If there is a consensus to continue, the Department will provide the resources and under your review we will move forward. If we can agree that further inquiry is not warranted, then we can reallocate resources accordingly.

This is not an issue of cost for the Department of Defense. The resources are there. They will be there as long as necessary. This is an issue of getting it right and doing the best job for veterans.

Senator Rudman, speaking for the Board responded, that he "would very much hope (that) by ... (August 1999) to give you our guidance ... as to how many more case studies, if any, you ought to do, those that in our view you ought to refine, those that you ought to discontinue."

CONCLUDING REMARKS BY THE SPECIAL ASSISTANT

Two years ago, when I assumed responsibility for the Defense Department's investigation of Gulf War illnesses, I was acutely aware of the public's mistrust—if not outright distrust—of DoD's history with this issue. There was little doubt DoD had not exercised the best judgment in addressing veterans' health concerns early on; and up through 1996, the department did not do the best possible job of making up lost ground. In short, whatever DoD did with respect to Gulf War illnesses, was, as far as Gulf War veterans, the Presidential Advisory Committee, the Congress, and the American people were concerned, too little and too late. The contentiousness that marked the era from the

end of the Gulf War until my office was formed in the Fall of 1996 created an information desert every bit as hostile and difficult to cross as the plains, valleys, and dunes of Kuwait, Saudi Arabia, and Iraq. On one side of that information desert was the War itself, on the other side was the public's right to know what happened during Desert Shield and Desert Storm. In the middle were misperceptions, stories, legends, myths, distortions, and, most importantly, facts. My challenge, in November, 1996, was to survey that territory, determine how best to cross it, and, once on the way, how to separate out and collect the facts from all the other non-factual obstacles that had accumulated since the war. It has not been an uneventful task.

We have faithfully, diligently, doggedly, sorted out facts through thousands of interviews with the men and women who were there. We have searched for records to help us compare accounts of events. We have studied the operational and physical environments of the war. And we have worked hand in hand with a number of agencies that have provided us with invaluable cooperation, staff support, research, and review of our products. The Department of Veterans Affairs, the Department of Health and Human Services, the Centers for Disease Control, the Central Intelligence Agency and its colleagues in the intelligence community, the Environmental Protection Agency, and many Defense Department agencies have all contributed to our progress. I would be remiss if I did not make mention of all their work on our behalf and on behalf of America's Gulf War veterans.

In this, our Second Annual Report, I have taken you through the accomplishments of the past year, with some connecting background from our first year. I hope I have demonstrated to you the scope of our efforts to leave no stone unturned in our journey to seek the truth about the Gulf War and its relationship to veterans who have every right to know if their health was in any way affected during that conflict.

I have not done this alone. My team in the Office of the Assistant Secretary of Defense for Gulf War Illnesses would not have been able to even get underway without the help of veterans around the country and around the world who were eager to help us with valuable information and often very personal stories. To the men and women who were there, I have the greatest respect; you bring to our effort the most compelling reason of all to pursue our mission: you want and expect and deserve the truth. That is a goal I have personally pledged to reach. I am confident that our nation's fighting forces—our Gulf War veterans, active duty and Guard and Reserve components—and their families and the citizens of this country for whom they all serve, will benefit from our diligence and determination.



**Special Assistant to the
Deputy Secretary of Defense
for Gulf War Illnesses**

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